Molecular Electron Microscopy Core

UNIVERSITY of VIRGINIA

The Molecular Electron Microscopy Core (MEMC) is a state-of-the-art facility dedicated to high-resolution electron cryo-microscopy and electron cryo-tomography for biological samples. This core is available to SOM faculty members and to scientists in other schools and departments at UVa. We also encourage scientists throughout Virginia and the surrounding states to visit UVa and take advantage of our resources for performing molecular-resolution electron microscopy.

For more information or discussion of projects, please contact Kelly Dryden: kdryden@virginia.edu

Facilities

Titan Krios
The new FEI Titan Krios microscope has an XFEG electron source and operates at 300kV. It has been designed to be extremely stable by environmentally isolating the system: grids are robotically transferred into the beam allowing remote operation by the user. The improved system provides superior controllability and reproducibility, and the ability to collect data on a single grid for up to a week. This microscope not only has a 4k x x4k CCD, but also a new Falcon II CMOS direct electron detector camera.

Tecnai F20
The Tecnai F20 can operate at 120kV or 200kV. It has a field emission gun (FEG) source of electrons, which provides better coherence. It is used for basic electron cryomicroscopy of moderate resolution projects, or for higher-resolution negative-stain data collection. It is equipped with a 4k x 4k UltraScan CCD camera.

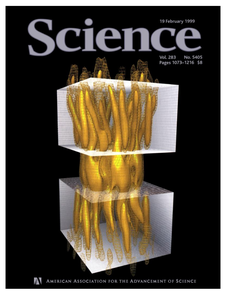
Spirit
The 120kV Tecnai Spirit is equipped with a tungsten filament electron source, and a 2kx2k UltraScan CCD camera. It is primarily available for routine screening negative-stained samples, but is capable of cryo-electron microscopy.

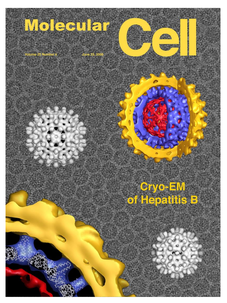
Techniques

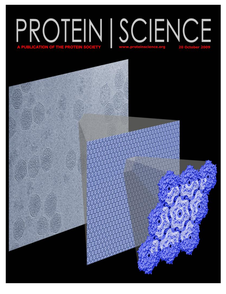
Electron Cryo-Microscopy (Cryo-EM)
CryoEM Unlike traditional TEM methods, CryoEM images are recorded on unstained and unfixed samples maintained under near-to-native physiologic conditions. For suitable specimens, computational analysis generates atomic models that rival those calculated by X-ray crystallography and NMR spectroscopy.

Electron Cryo-Tomography (CET)
While the resolution achievable by CET is only about 30-40Å, this technique allows calculation of three-dimensional maps for non-regular structures, larger cellular complexes, and cell sections. More regular objects from within the tomogram may be further analyzed by sub-tomogram averaging to reach higher resolution of particular features

Micro Electron Diffraction (MicroED)
New advances in sample preparation and electron detection have led to the ability to collect full diffraction data on three-dimensional micro crystals. Many samples that x-ray crystallographers are interested in do not grow large enough crystals. MicroED has the potential to get three dimensional structures from difficult samples.







The MEMC is located in the Life Sciences Annex (LiSA) adjacent to the Snyder Translational Science Building on the Fontaine Research Campus.